ABSTRACT

The work describes the Comparative study on Design of Controllers for Brushless DC motor, Switched Reluctance motor and Permanent Magnet Synchronous motor using Soft computing techniques such as Genetic Algorithm, Ant colony Search Algorithm and Particle Swarm Optimization. The controllers are designed in such a way that PID, Fuzzy-PID, Neuro and Neuro-Fuzzy and the transient specifications are analyzed and compared. The proposed approach has good features, including easy implementation, stable convergence characteristic and good computational efficiency. Brushless DC (BLDC) motors are widely used in many industrial applications because of their high efficiency, high torque and low volume. This work proposes a set of controllers to control the Brushless DC motor and the characteristics such as Torque, Voltage, Current and Speed. It is difficult to tune the parameters and get satisfied control characteristics by using normal conventional PID controller. As Fuzzy has the ability to satisfy control characteristics, it is easy for computing. In order to control the BLDC motor, a Fuzzy PID controller with PSO is designed as the controller of the BLDC motor. The purpose of this work is to design a speed controller for a SR Motor in order to achieve minimum torque ripple and high performance in speed tracking. But, eventually an optimization algorithm to reach the goals
and constraints in different set points is defined and its parameters are optimized with the help of various algorithms. SR Motor is one of the most efficient and robust type of motor which is best at most environmental aspects. But the main problem concerned with SR Motor is torque ripples and acoustic noise which reduces the efficiency and working ability of SR Motor. This property of SR Motor reduces its extended usage. But, coming out from the conventional PID controller, the new controllers are introduced to control the SR Motor which not only gives an effective control and also reduces the complexity in controlling the motor.

Permanent Magnet Synchronous Motor is widely used in high performance motion control applications. By using biological inspired technique, it is found that the closed loop system has very fast rise time, settling time and less overshoot to sustain the system stability under servo condition. From the transient response, it is observed that the Soft Computing method gives fast response. These methods are better when compared with conventional methods. For the same model, the closed loop control system requires the controller for improvement of transient response of the error signal. The tuning of PID controller in real time is bit difficult and moreover it lacks the disturbance rejection capability. The proposed control strategies possess good transient response but has problem with load disturbance response i.e. regulatory response. The field oriented or vector control is used in the design of PMSM to achieve smooth starting and acceleration. The
Proposed work computes the speed controls of Permanent Magnet Synchronous Motor using Controllers with Soft Computing Techniques and the characteristics curves are analyzed and the results are presented.